

REMARKS

Claims 1-12 are all the claims pending in the application. Claims 3-8 and 10 have been amended and new claims 11 and 12 corresponding to claims 3 and 10, respectively, have been added.

In addition, the Abstract of the Disclosure has been amended to change the "=" signs to "≤" or "≥" to be consistent with the rest of the disclosure.

Entry of the above amendments is respectfully requested.

I. Response to Objection to the Specification and Claims 4-10

The Examiner objects to the abstract of the disclosure because there are typographical errors present.

The Abstract of the Disclosure has been amended to change the "=" signs to "≤" or "≥" to be consistent with the rest of the disclosure.

In addition, claims 4-10 are objected to as improperly depending from another multiple dependent claim. Claims 3-8 and 10 have been amended and new claims 11 and 12 corresponding to claims 3 and 10, respectively, have been added.

In view of the above, withdrawal of the objection is respectfully requested.

II. Response to Rejection of Claims 1-3 under 35 U.S.C. § 103(a)

Claims 1-3 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Kunishige (US 4,472,208) in view of Tamehiro (US 6,264,760).

Applicants respectfully traverse the rejection.

Claim 1 is directed to an ultrahigh-strength hot-rolled steel, wherein its chemical composition comprises, by weight:

$$\begin{aligned}0.05\% &\leq C \leq 0.1\% \\0.7\% &\leq Mn \leq 1.1\% \\0.5\% &\leq Cr \leq 1.0\% \\0.05\% &\leq Si \leq 0.3\% \\0.05\% &\leq Ti \leq 0.1\% \\Al &\leq 0.07 \\S &\leq 0.03\% \\P &\leq 0.05\%\end{aligned}$$

the balance being iron and impurities resulting from the smelting, said steel having a bainite-martensite structure that may contain up to 5% ferrite. In the present invention, ferrite is avoided because titanium would precipitate in that phase leading to a decrease of the mechanical strength (*see* page 5, lines 1-9 of the specification).

However, in Kunishige, the ferrite amount is maintained to at least 10% (*see* col. 8, lines 42-52) and the manufacturing process is modified so that precipitation of titanium also occurs in the bainite phase. This is obtained through modification of the hot-rolling process (*see* col. 3, lines 15-28). Therefore, the presence of ferritic structure is a feature in Kunishige, and thus Kunishige "teaches away" from eliminating or reducing the amount of ferrite structure. Accordingly, one of ordinary skill in the art would not be motivated to decrease the amount of ferritic structure.

In addition, the present invention contains a microstructure containing martensite which is not present in Kunishige. Replacing ferrite by martensite would not be considered by one of ordinary skill in the art as the behaviour of those phases are opposite: ferrite has a low strength but a high formability whereas martensite is very hard and difficult to form.

Furthermore, the composition of the steels of Kunishige and Tamehiro differ, and thus, one of ordinary skill in the art would not process of the steel of Kunishige in the same manner as that of Tamehiro.

Tamehiro also describes steel for use at a very low temperature for pipelines, which is different from the present invention, which is primarily used for car parts manufacturing as described in the specification. The composition described in Tamehiro contains a large amount of manganese (more than 1.7%), which would be detrimental to the ductility of the steel, and does not contain enough titanium (less than 0.03%), niobium, nickel and molybdenum. Additionally, the microstructure of the steel of Tamehiro is very specific and only obtained through a very special hot rolling process, tailored made for its composition. Further, the strengthening of the steel of Tamehiro occurs not only through refining of the grain sizes of the microstructure, but also through precipitation of carbides or carbonitrides of vanadium, niobium and molybdenum. These precipitates are aimed at improving the mechanical characteristics of the heat affected zone after welding (HAZ).

Moreover, the martensite contained in Tamehiro steel plates is an auto-tempered, fine grained lath martensite (*see col. 4, lines 29-35*), which is a very specific type of martensite, more easily formed than the regular type of martensite. And, it is tempered which reduces its hardness and improves its ductility.

In contrast, in the present invention, a non-tempered martensite is obtained through coiling at low temperature in order not to reduce its strength. It is also noted that Tamehiro plates are not coiled but only formed into linepipes by slow deformation (*see col. 14 lines 15-21*).

One of ordinary skill in the art would not consider using the process of Tamehiro with the composition of Kunishige, as there is no rational reason, particularly from a metallurgical standpoint. As explained in Tamehiro (*see col. 5, lines 28-50*), the process of Tamehiro is specifically adapted to the composition of Tamehiro and would not be applicable to composition of Kunishige, which does not contain V, Nb or Mo. On the other hand, Kunishige deals with

titanium precipitation, which is not foreseen in Tamehiro; titanium being only present to fix nitrogen (*see* col. 9, lines 7-29). Accordingly, one of ordinary skill in the art would not be motivated to modify Kunishige as proposed by the Examiner in view of Tamehiro to arrive at the claimed invention.

For at least the above reasons, it is respectfully submitted that a *prima facie* case of obviousness has not been established.

In view of the above, withdrawal of the rejection is respectfully requested.

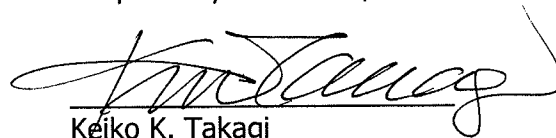
III. Conclusion

In view of the above, reconsideration and allowance of claims 1-12 is respectfully requested.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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